Socio-demographic Correlates of Cigarette Smoking Among High School Students

Results from the British Columbia Youth Survey on Smoking and Health

Joy L. Johnson, PhD, RN¹

Rochelle S. Tucker, MHSc²

Pamela A. Ratner, PhD, RN³

Joan L. Bottorff, PhD, RN¹

Kenneth M. Prkachin, PhD, RPsych⁴

Jean Shoveller, PhD⁵

Bruno Zumbo, PhD⁶

ABSTRACT

Objective: To describe the association between selected socio-demographic factors (age, gender, ethnicity, and region) and the prevalence of smoking among adolescents in two regions of British Columbia, and to report recent findings related to the prevalence of tobacco use in British Columbia.

Methods: A cross-sectional school-based survey was conducted using a random sample of 3,280 students from 13 schools in two regions of British Columbia. Multivariate logistic regression analysis was used to determine the association between age, region, gender and ethnicity and smoking status.

Results: Ethnic group membership was strongly associated with smoking status, which changed very little after controlling for the other socio-demographic factors. Controlling for age and ethnicity, the effect of gender on smoking status was moderated by region.

Conclusion: Reliance on general population tobacco use prevalence rates masks important ethnic and gender differences. To increase the effectiveness of tobacco control policies and programming, greater attention needs to be paid to the socio-demographic correlates associated with adolescents' tobacco use.

La traduction du résumé se trouve à la fin de l'article.

1. Professor and CIHR Investigator, Nursing and Health Behaviour Research Unit, School of Nursing, University of British Columbia

2. Doctoral Candidate, Harvard School of Public Health; Project Director, NAHBR

3. Associate Professor and CIHR New Investigator, NAHBR

4. Professor, College of Arts, Social and Health Sciences, University of Northern British Columbia

5. Assistant Professor, Department of Health Care and Epidemiology, UBC

6. Professor, Measurement, Evaluation & Research Methodology, UBC

Correspondence: Dr. Joy L. Johnson, School of Nursing, University of British Columbia, T201 - 2211 Wesbrook Mall, Vancouver, BC V6T 2B5, Tel: 604-822-7435, E-mail: Joy.Johnson@ubc.ca

Acknowledgement: This study was supported by a grant from the Canadian Institutes of Health Research.

There is accruing evidence that the prevalence of cigarette smoking among Canadian adolescents aged 15-19 years has been declining in recent years. In the latest national survey on tobacco use, less than one quarter of teenagers (24% of girls and 21% of boys) reported smoking cigarettes, either daily or occasionally.¹ While still highly problematic, these rates are significantly lower than the levels recorded in the mid-1990s and suggest that youth tobacco reduction initiatives may be having some impact. The distribution of smoking among teenagers across the country, however, is far from uniform. There is considerable variation in the prevalence of youth smoking across provinces, hovering around 18% in British Columbia compared to 30% in New Brunswick and Quebec.^{2,3} Regional differences within British Columbia also have been documented.⁴ There is some evidence of substantial differences in the prevalence of smoking among Canadian teenagers of different ethnic backgrounds.^{3,5,6} Socio-demographic correlates of tobacco use by Canadian adults have not been systematically observed in the adolescent population. Although the reporting of gender and provincial differences in youth smoking rates is common and useful, given the variability in prevalence rates, documentation of how tobacco use varies across other subgroups of Canadian adolescents remains relatively scarce.

Given differences in the way gender itself is both structured and experienced by adolescents from different subgroups,⁷ it may have more of an influence on the prevalence of smoking for certain adolescent subpopulations. The purpose of this paper is to describe the associations between particular socio-demographic factors (age, gender, ethnicity, region) and the prevalence of smoking among adolescents in two regions of British Columbia.

METHODS

Setting

The British Columbia Youth Survey on Smoking and Health (BCYSOSH) is a cross-sectional survey that took place in two regions of British Columbia: the City of Vancouver and the City of Prince George and area. Vancouver has a population of 546,000 (excluding its suburbs)

with a median household income of \$42,026 and median age of 37.2 years. The population is ethnically diverse with 49.0% indicating that they are members of visible minority groups (non-Aboriginal), mostly Chinese and South Asian; 1.9% of the population is Aboriginal. Prince George, known as BC's northern capital, has a population of 85,000. The median household income is \$52,826 and the median age is 34.5 years. The community is less diverse with 5.3% identifying with a non-Aboriginal visible minority group (mostly South Asian); 9.4% of the population is Aboriginal.⁸

Sample

The BCYSOSH was administered between October 2001 and May 2002 to a stratified, random sample of 3,280 students enrolled in grades ten and eleven in 13 schools in two school districts in British Columbia. For Vancouver, a stratified random sample of schools was used because of significant socio-economic differences across the city's neighbourhoods. The city was divided into two strata (Eastside and Westside) and schools within each stratum were randomly selected to participate. An attempt was made to survey all of the grades ten and eleven students at the selected schools. Six of the seven secondary schools participated in the survey. For Prince George, the randomization process was conducted separately for grades ten and eleven students because a large number of grade ten students attend junior secondary schools. While all of the seven schools that were randomly selected to participate in the survey agreed to participate, at two schools it was not possible to survey the entire grade.

Study design

Participants completed a self-administered questionnaire during class time in the presence of a researcher. Most students completed the survey in 30 to 45 minutes. In all but one of the schools, a passive consent procedure was adopted where parents were informed about the study by a letter sent home from the school. Active parental consent was used in one school. These consent procedures were approved by the relevant university and school ethical review committees.

TABLE I

Socio-demographics of Sample by Region

Socio-demographic Variable	n	Vancouver %	Prince George & Area n	%
Age Group				
14-16 years	2043	88.0	700	73.0
>17 years	265	11.4	250	26.1
Missing	13	0.6	9	0.9
Gender				
Boys	1152	49.6	500	52.1
Girls	1169	50.4	457	47.7
Missing	—	—	2	0.21
Self-reported Ethnicity				
White	620	26.7	759	79.1
Asian	1285	55.4	16	1.7
Aboriginal / First Nations	45	1.9	98	10.2
South Asian	96	4.2	31	3.2
Mixed	153	6.6	19	2.0
Other	97	4.2	21	2.1
Missing	25	1.1	15	1.6

Measures

Demographics

Participants were asked to identify their age (in years), their grade in school, and their sex (male or female). Self-reported ethnicity was determined with the question, "How would you describe yourself?" Twelve possible responses were provided (e.g., Chinese, Filipino, White/Caucasian) including an "other, please specify" option based on the categories included in the latest Canadian Census. Multiple categories could be selected.

Smoking Status

All of the participants were asked about their lifetime experience of smoking cigarettes. Participants who had smoked at least once (regardless of the amount smoked) during the month preceding the survey were classified as "smokers." Students who had not smoked in the month preceding the survey were classified as "non-smokers."

Statistical analysis

The statistical analysis was conducted in two steps. First, we documented the prevalence of smoking in the overall sample and in each of the two regions, across age, gender and self-reported ethnic groups. Second, we performed logistic regression analyses, using SAS Version 8.1 For Windows and Hosmer and Lemeshow's⁹ strategy to determine how age, gender, self-reported ethnicity and region were associated with smoking in our sample. All cases with missing values on any of the predictor variables were deleted from the logistic regression analyses, yielding an effective sample size of 3,201.

RESULTS

Completed questionnaires were received from 3,280 students. The overall response rate was over 80%. Most of the participants reported being enrolled in either grade ten (n=1,508) or grade eleven (n=1,551), though a few students from other grades also participated (n=221). The percentage of students aged 17 and older was slightly higher in the Prince George region. As expected, there was remarkable variation in the ethnic composition of the sample between regions (see Table I).

The prevalence of smoking

The prevalence rates of smoking for the overall sample and each of the two regions, by gender and self-reported ethnicity are displayed in Table II. While the overall prevalence of tobacco use in this study (16.6%) was close to the latest provincial average of 17% for 15-19 year olds in British Columbia,² there were differences in the prevalence of tobacco use in the two regions for both boys and girls. These differences were related, in part, to differences in the age and ethnic composition of the samples from each region. More than 40% of the Aboriginal/First Nations adolescents who participated in this study reported smoking compared to 22% of White/Caucasian adolescents and less than 10% of Asian adolescents.

Logistic regression

Logistic regression analyses were carried out using the reduced sample (n=3,201) (those with complete data). Based on the unadjusted analyses, the odds of smoking were significantly lower for students aged 14-16 years com-

TABLE II

Smoking Status of All Participants in the BCYSOSH by Gender and Self-reported Ethnicity

Socio-demographic Variable		Vancouver		Prince George & Area		Overall Sample	
		Smokers n (%)	Non-smokers n (%)	Smokers n (%)	Non-smokers n (%)	Smokers n (%)	Non-smokers n (%)
Self-reported Ethnicity							
	White / Caucasian						
	Boys	56 (18.4)	248 (81.6)	87 (22.7)	296 (77.3)	143 (20.8)	544 (79.2)
	Girls	54 (17.1)	262 (82.9)	108 (28.9)	266 (71.1)	162 (23.5)	528 (76.5)
	Total	110 (17.7)	510 (82.3)	197 (26.0)	562 (74.0)	307 (22.3)	1072 (77.7)
Asian							
	Boys	62 (10.0)	561 (90.0)	1 (10.0)	9 (90.0)	63 (10.0)	570 (90.0)
	Girls	38 (5.7)	624 (94.3)	—	6 (100.0)	38 (5.7)	630 (94.3)
	Total	100 (7.8)	1185 (92.2)	1 (6.3)	15 (93.8)	101 (7.8)	1200 (92.2)
Aboriginal / First Nations							
	Boys	3 (16.7)	15 (83.3)	29 (50.9)	28 (49.1)	32 (42.7)	43 (57.3)
	Girls	10 (37.0)	17 (63.0)	23 (56.1)	18 (43.9)	33 (48.5)	35 (51.5)
	Total	13 (28.9)	32 (71.1)	52 (53.1)	46 (46.9)	65 (45.5)	78 (54.5)
South Asian							
	Boys	8 (14.0)	49 (86.0)	1 (5.9)	16 (94.1)	9 (12.2)	65 (87.8)
	Girls	7 (18.0)	32 (82.0)	1 (7.1)	13 (92.9)	8 (15.1)	45 (84.9)
	Total	15 (15.6)	81 (84.4)	2 (6.5)	29 (93.6)	17 (13.4)	110 (86.6)
Mixed							
	Boys	15 (17.4)	71 (82.6)	2 (16.7)	10 (83.3)	17 (17.4)	81 (82.7)
	Girls	14 (20.9)	53 (79.1)	2 (28.6)	5 (71.4)	16 (21.6)	58 (78.4)
	Total	29 (19.0)	124 (81.0)	4 (21.1)	15 (79.0)	33 (19.2)	139 (80.8)
Other							
	Boys	10 (20.0)	40 (80.0)	1 (7.1)	13 (92.9)	11 (17.2)	53 (82.8)
	Girls	12 (25.5)	35 (74.5)	4 (57.1)	3 (42.9)	16 (29.6)	38 (70.4)
	Total	22 (22.7)	75 (77.3)	5 (23.8)	16 (76.9)	27 (22.9)	91 (77.1)
Missing							
	Boys	3 (21.4)	11 (78.6)	2 (28.6)	5 (71.4)	5 (23.8)	16 (76.2)
	Girls	5 (45.5)	6 (54.5)	2 (25.0)	6 (75.0)	7 (36.8)	12 (63.2)
	Total	8 (32.0)	17 (68.0)	4 (26.7)	11 (73.3)	12 (30.0)	28 (70.0)
Total		297 (12.8)	2024 (87.2)	265 (27.6)	694 (72.4)	562 (17.1)	2718 (82.9)

TABLE III

Multivariate Logistic Regression of Smoking Status on Age Group, Region, Ethnicity and Gender (n=3201)

Socio-demographic Variable		Odds Ratio	95% Confidence Interval
Age group*	14-16 years	0.51	0.40-0.65
	17-18 years		referent
Ethnic group	White	1.0	referent
	Asian / South Asian	0.40	0.31-0.52
	Aboriginal / First Nations	2.84	1.97-4.10
	Mixed / Other	1.14	0.82-1.59
Region and Gender Interaction			
	Vancouver		
	Boys	1.0	referent
	Girls	0.87	0.68-1.12
Prince George			
	Boys	1.0	referent
	Girls	1.56	1.15-2.11
Boys			
	Prince George	1.0	referent
	Vancouver	0.96	0.70-1.31
Girls			
	Prince George	1.0	referent
	Vancouver	0.40	0.54-0.73

* Because of model specification problems, the data were collapsed into two age groups: 14-16 year olds and 17-18 year olds. A small number of 19-year-old students were dropped from the analysis due to insufficient cell sizes.

pared with students aged 17-18 (OR=0.44, CI 0.35-0.56), students from Vancouver compared with students in Prince George and area (OR=0.39, CI >32-0.47) and Asian/South Asian students compared with White students (OR=0.32, CI 0.26-0.41). First Nations/Aboriginal participants were approximately three times more likely to be smokers compared with White participants (OR=2.96, CI 2.06-4.23). While gender did not appear to be a significant predictor of smoking status in the univariate analysis, given our purpose and the prevalence data, it was retained in the model-building process.

The results of our multivariate logistic regression analyses are displayed in Table III. The model demonstrated acceptable goodness-of-fit; the Hosmer and Lemeshow statistic was $\chi^2 = 8.92$ (df=6, p=0.18, n=3,201). Age group and ethnic group remained significant predictors of smoking status after controlling for region and gender. Region and gender were found to interact such that girls were 56% more likely to smoke than boys, in Prince George. No gender differences were noted for Vancouver. Conversely, girls from Prince George were 60% more likely to

smoke than Vancouver girls. Boys' smoking rates did not vary by region.

DISCUSSION

To date, Canadian studies of adolescent tobacco use have not consistently considered the differential effects of region, gender and ethnicity. In this study, gender had a differential effect in the two regions that only became apparent when we examined the data in relation to regional differences. The prevalence of smoking was particularly elevated among girls in the Prince George region of BC compared to boys in that region. No significant gender differences in the prevalence were noted in Vancouver. Further research is required to understand how and why gender has such a strong impact on adolescent tobacco use in certain contexts. And, how it is that significant gender differences in the prevalence of adolescent smoking are not found in Vancouver when they are reported in so many regions of Canada.

The prevalence of smoking was very low among Asian and South Asian adolescents and extremely high among Aboriginal/First Nations adolescents. While a limited number of Aboriginal adolescents participated in this study, the findings confirm that the smoking rates in this group are high.^{3,10} Further research is required to understand the factors influencing the uptake of tobacco and the smoking patterns of Aboriginal

youth to provide a basis for culturally appropriate programming. Currently, in British Columbia, there are several promising initiatives in Aboriginal communities that are directed at tobacco reduction and smoking cessation. Those Aboriginal youth living off reserves in urban areas may not benefit from such programming. Other innovative initiatives are required to reach out to Aboriginal youth and to assist them in meaningful ways to deal with tobacco use issues.

This study included one region with a large population of Asian and South Asian adolescents. Further research should be directed at examining why smoking is less prevalent among these adolescents and if smoking rates remain low in this population in early adulthood. There is recent evidence that a significant proportion of Canadian post-secondary students begin smoking after graduating from high school.¹¹ Further research should examine whether certain subgroups of adolescents are more or less likely to begin smoking in that context.

Those working in the field of public health should resist the temptation to rely exclusively on general population statistics regarding youth smoking rates when considering programming priorities. To date, our smoking cessation programming has tended to ignore socio-demographic differences in favour of more generic cessation programming. These data suggest that current tobacco reduction initiatives are having a differential impact on adolescents from different segments of the population. If we are to develop effective programming for youth, we must assess the impact current policy has on subgroups of the population and develop programming for those subgroups that are smoking at higher rates.

British Columbians often take comfort in the notion that our smoking prevalence is relatively low and are quick to credit these low rates to effective policies and programs. Indeed, the BC Ministry of Health website on youth smoking suggests that BC is "leading the way" in Canada. While BC's tobacco reduction initiatives may be responsible, in part, for the gains made in reducing smoking among youth, part of BC's 'success' may be attributable to population demographics.

This analysis was limited to an examination of smoking prevalence and did not consider variation in the amount smoked or patterns of tobacco dependence. It was also limited to an examination of two regions of British Columbia. Inclusion of other regions may have revealed additional variations in smoking rates. The data are based upon self-report and some under-reporting and misclassification may have occurred. It is possible that some of the differences we found can also be explained by individual and familial factors that have been consistently associated with tobacco use among youth (e.g., parental smoking, depression, alcohol use).¹² The next challenge is to examine the relative impact that these factors have on the smoking behaviour of particular subgroups of adolescents.

In conclusion, reliance on general tobacco rates masks important regional, ethnic and gender differences. To increase the effectiveness of tobacco policies and programming, greater attention needs to be paid to the socio-demographic correlates associated with youth tobacco use. In particular, research is required to examine the influence of socio-demographic factors on youth smoking. Observed ethnic differences in smoking prevalence may be confounded or modified by other socio-demographic factors. Future research investigating factors associated with adolescent tobacco use should include an analysis of socio-demographic correlates because some factors may have more or less of an impact on certain subgroups of the adolescent population.

RÉSUMÉ

Objectif : Décrire l'association entre certains facteurs socio-démographiques (l'âge, le sexe, l'appartenance ethnique et la région) et la prévalence du tabagisme chez les adolescents de deux régions de la Colombie-Britannique et rendre compte de constatations récentes liées à la prévalence du tabagisme dans cette province.

Méthode : Nous avons mené une enquête transversale en milieu scolaire auprès d'un échantillon aléatoire de 3 280 élèves de 13 écoles situées dans deux régions de la Colombie-Britannique. Par analyse de régression logistique à plusieurs variables, nous avons déterminé l'association entre l'âge, la région, le sexe et l'appartenance ethnique, d'une part, et l'usage du tabac d'autre part.

Résultats : L'appartenance ethnique était fortement associée à l'usage du tabac, un résultat qui a très peu changé, même après avoir apporté des ajustements pour tenir compte des effets des autres facteurs socio-démographiques. Après les ajustements en fonction de l'âge et de l'appartenance ethnique, l'effet du sexe sur l'usage du tabac était modéré par la région.

Conclusion : En s'appuyant exclusivement sur les taux de prévalence du tabagisme dans la population générale, on masque d'importantes différences liées à l'appartenance ethnique et au sexe. Pour accroître l'efficacité des politiques et des programmes antitabac, il faut s'intéresser de plus près aux corrélats socio-démographiques associés au tabagisme chez les adolescents.

REFERENCES

1. Health Canada. Smoking in Canada: An overview. CTUMS (Canadian Tobacco Use Monitoring Survey), Annual, February-December 2001. Ottawa, ON, 2001;1-4.
2. Health Canada. Youth Smoking in Canada CTUMS (Canadian Tobacco Use Monitoring Survey), Annual, February-December 2000. Ottawa, ON, 2000;1-4.
3. Adlaf EM, Bondy SJ. 1994 Youth Smoking Survey, Technical Report, Chapter 3. Ottawa, ON: Health Canada, 1997;37-58.
4. Heart and Stroke Foundation of B.C. & Yukon. Tobacco Use in B.C. in 1997. Vancouver, BC, Heart and Stroke Foundation of B.C. & Yukon.
5. Holowaty P, Feldman L, Harvey B, Shortt L. Cigarette smoking in multicultural, urban high school students. *J Adolescent Health* 2000;27:281-88.
6. Peters L. Lighting up: Tobacco use among BC youth: Results from the Adolescent Health Survey II. Burnaby, BC: McCreary Centre Society, 2000.
7. Lorber J. *Paradoxes of Gender*. New Haven, CT: Yale University Press, 1994.
8. Statistics Canada. 2001 Community Profiles. Statistics Canada, 2003.
9. Hosmer DW, Lemeshow S. *Applied Logistic Regression*. New York, NY: John Wiley & Sons, 1989.
10. British Columbia. Ministry of Health and Ministry Responsible for Seniors. Honouring Our Health: An Aboriginal Tobacco Strategy for British Columbia. 2002.
11. Cairney J, Lawrance K. Smoking on campus: An examination of smoking behaviours among post-secondary students in Canada. *Can J Public Health* 2002;93(4):313-16.
12. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: A critical review of the literature. *Tobacco Control* 1998;7:409-20.

Received: May 28, 2003

Accepted: January 30, 2004